New Vascular Plant Species Discoveries in the Northern Colorado Plateau Network: 2008 Update

By Walter Fertig, Moenave Botanical Consulting, Kanab, UT

Sarah Topp, Northern Colorado Plateau Network, National Park Service, Moab, UT

Mary Moran, Biological Technician, Resource Management Division, Southeast Utah Group, National Park Service, Moab, UT

Rebecca Weissinger, Northern Colorado Plateau Network, National Park Service, Moab, UT

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Madsen's daisy (*Erigeron vagus* var. *madsenii*), a newly described variety of the wide-ranging cordilleran speces *Erigeron vagus* endemic to Claron limestone outcrops in the Paunsaugunt and Markagunt plateaus of south-central Utah, including Bryce Canyon National Park and Cedar Breaks National Monument. Var. *madsenii* was described in 2008 by Stan Welsh and Duane Atwood in the fourth edition of *A Utah Flora* and commemorates Mark Madsen, botanist with Dixie National Forest, who collected the holotype in 2000. Photo from Snow Ridge, Cedar Breaks National Monument, by Douglas N. Reynolds.

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Introduction

From 2004-2007, the National Park Service's Inventory and Monitoring Program funded a series of research projects to update vascular plant species checklists for each of the 16 national park units in the Northern Colorado Plateau Network (NCPN). These projects entailed a thorough reexamination of all herbarium specimens in the museum archives of each park, as well as a review of specimens in other state and regional herbaria and pertinent published and unpublished literature. Information was compiled on all plant species confirmed as present in a park (with a corroborated voucher specimen) or reported in the literature (without a specimen), as well as species that might potentially occur or which had been shown to be falsely reported. The resulting data were compiled in the Park Service's NPSpecies database and in a series of technical reports (Fertig 2008a, 2008b, 2009a, 2009b, 2009c, 2009d, Fertig and Alexander 2008a, 2008b, Fertig and Atwood 2008, Fertig and Kyte 2009, Fertig and Topp 2008, Fertig et al. 2009a, 2009b, Hogan et al. 2009, 2009a, 2009b).

The task of writing a species checklist is never final, however, as new species are continually uncovered through additional field work. Such is the case with many of the park units in the Northern Colorado Plateau Network. In just a year since the NPSpecies and annotated checklist projects were completed, over 50 new plant species have been documented during rare plant surveys, weed inventories, and routine monitoring.

Species nomenclature is also prone to frequent change. In 2008, Dr. Stanley Welsh and colleagues published a revised version of *A Utah Flora* which introduced dozens of name changes and added over 100 new species to the state. Many of the name changes and newly described taxa affect the flora of the 11 Utah parks in the NCPN.

The following report is a summary of new species discoveries, changes in status, and revisions in nomenclature, that have occurred in the floras of 13 park units in the NCPN since spring 2008 (revisions for Pipe Spring National Monument have been addressed in a separate document, Fertig 2008c). The report is intended as an addendum to the annotated checklists prepared in 2007-2008 and currently being published by the National Park Service as part of its technical report series. Additional discoveries are likely in the coming years, and we will attempt to keep the species lists as current as possible with future addenda.

Methods

New species records were documented primarily from field surveys conducted in 2008. These studies included investigation of rare plants in Cedar Breaks National Monument (Fertig and Reynolds 2009), monitoring projects in Arches and Canyonlands national parks and Curecanti National Recreation Area, and invasive species mapping in Fossil Butte National Monument and Golden Spike National Historic Site. Additional species reports and changes in park status were derived from revisiting the Brigham Young University herbarium (BRY) and from the internal review process for the 16 annotated

checklist reports. Lastly, a number of new species and nomenclatural changes were found during a review of the newly published fourth edition of *A Utah Flora* (Welsh et al. 2008).

Results

Additions to park floras, changes in status, and updates in nomenclature are summarized for each park in the following section. Table 1 provides a summary of the newly documented species for seven of the 16 parks in the Northern Colorado Plateau Network in 2008. Table 2 contains corrections and changes in park status discovered since the annotated checklists for each park were finalized. Table 3 lists changes in species nomenclature for 11 Utah parks derived from the revised fourth edition of *A Utah Flora* (Welsh et al. 2008).

Arches National Park

Welsh et al. (2008) recognized the lavender-flowered form of *Calochortus nuttallii* from Cretaceous Mancos shale and Jurassic Morrison badlands of Grand County and the Duchesne River formation in Duchesne and Uintah counties as a new species, named *Calochortus ciscoensis* for the Cisco area north of Arches. One record of this species is known from Arches National Park (Table 1) in the Klondike Wash area (Welsh and Moore #2051). This specimen had been the basis for the park's report of *Calochortus nuttallii* cited by Fertig et al. (2009a) and Harrison et al. (1964). *C. nuttallii* is still thought to be present in Arches, but there appears to be no voucher specimen available at present for confirmation. Cisco sego-lily is the tenth locally endemic vascular plant species known for Arches National Park. It currently has no legal protective status and has not yet been ranked by the state natural heritage program, but should be considered as a species of potential concern in the park based on its limited range and high habitat specificity.

In August 2008, Mary Moran collected English plantain (*Plantago lanceolata*) along the Colorado River, marking the first record of this introduced species in Arches National Park (Table 1). This discovery, and the recognition of *Calochortus ciscoensis,* increased the known flora of the park to 523 species, of which 76 are now known to be non-native (Fertig et al. 2009a). English plantain is not listed as a Noxious weed in Utah and is usually not considered a pest species.

Twelve species known to be present, reported, potential, or falsely reported for Arches National Park have undergone name changes (Table 3) based on the revised Utah Flora (Welsh et al. 2008).

Table 1. New Vascular Plant Taxa Confirmed or Reported for NCPN park units based on 2008 Surveys and Literature Review.

Family	Species Name	Synonyms/ Taxonomic Notes	Common Name	Life Form	Range	Park Status	Pop. Size	Source (Repository)	Year Doc.	Park and Comments
Chenopodiaceae	*Krascheninnikovia lanata* var. *lanata*	*Ceratoides lanata, Eurotia lanata,* vars not recognized in FNA 2003.	Winterfat	Shrub	Wide	Pres	Com	Topp ST07130802 (UTC)	2008	New to GOSP
Chenopodiaceae (Sarcobataceae)	*Sarcobatus vermiculatus*		Greasewood	Shrub	Wide	Pres	Rare	Topp ST07130803 (UTC)	2008	New to GOSP, previously on Potential list
Compositae (Asteraceae)	*Artemisia carruthii*		Carruth's wormwood	PerF	Wide	Pres	Rare	Fertig & Reynolds 24233 (CEBR)	2008	New to CEBR, previously on Potential list
Compositae (Asteraceae)	*Cirsium clavatum* var. *clavatum*		Fish Lake thistle	PerF	RegEn	Pres	Rare	Welsh & Neese 21349 (BRY)	1982	New to CEBR, previously on Potential list
Compositae (Asteraceae)	*Ericameria parryi* var. *howardii*	*Chrysothamnus parryi* var. *howardii*	Parry's rubber rabbitbrush	Shrub	Wide	Rep	Unk	Topp observation	2008	Observed but not vouchered for FOBU
Compositae (Asteraceae)	*Erigeron divergens* var. *divergens*		Spreading daisy	PerF	Wide	Pres	Unc	Fertig & Reynolds 24210 (CEBR)	2008	New to CEBR, previously on Potential list
Compositae (Asteraceae)	*Machaeranthera canescens* var. *canescens*	*Aster canescens, Dieteria canescens* var. *canescens*	Hoary aster	PerF	Wide	Pres	Unc	Fertig & Reynolds 24230 (CEBR)	2008	New to CEBR, previously on Potential list
Compositae (Asteraceae)	*Tetradymia canescens*		Spineless horsebrush	Shrub	Wide	Pres	Unc	Fertig & Reynolds 24231 (CEBR)	2008	New to CEBR, previously on Potential list
Crassulaceae	*Sedum rhodanthum*	*Rhodiola rhodantha, Clementsia rhodantha*	Redpod stonecrop	PerF	Wide	Pres	Rare	Fertig & Reynolds 24094 (CEBR)	2008	New to CEBR, previously on Potential list

Family	Species Name	Synonyms/ Taxonomic Notes	Common Name	Life Form	Range	Park Status	Pop. Size	Source (Repository)	Year Doc.	Park and Comments
Equisetaceae	*Equisetum hyemale* var. *affine*	*E. praealtum, Hippochaete hyemalis* ssp. *affinis*	Tall scouring-rush	Fern	Wide	Pres	Unc	Fertig & Reynolds 24212 (CEBR)	2008	New to CEBR
Gramineae (Poaceae)	*Aegilops cylindrica*	*Cylindropyrum cylindricum*	Jointed goat-grass	AnnG	Intro	Pres	Rare	Topp ST07110801 (UTC)	2008	New to GOSP (previously considered Potential). Native to Eurasia.
Gramineae (Poaceae)	*Bothriochloa ischaemum*	*B. ischaemum* var. *songarica*	Yellow bluestem	PerG	Intro	Pres	Unk	Moran s.n. (CANY)	2008	New to CANY, previously listed as Potential
Gramineae (Poaceae)	*Eragrostis hypnoides*		Teal lovegrass	AnnG	Periph	Pres	Unk	Moran s.n. (CANY)	2008	New to CANY
Labiatae (Lamiaceae)	*Mentha arvensis* var. *glabrata*	*M. arvensis* var. *canadensis*	Field mint	PerF	Wide	Rep	Unk	Moran s.n. (CANY)	2008	New to CANY, previously listed as Potential
Leguminosae (Fabaceae)	*Psoralidium lanceolatum* var. *lanceolatum*	*Psoralea lanceolata*	Lemon scurf-pea	PerF	Wide	Pres	Unc	Weissenger RW07130801 (UTC)	2008	New to GOSP and Box Elder Co, UT
Liliaceae (Calochortaceae)	*Calochortus ciscoensis*	Formerly included in *C. nuttallii*. *C. ciscoensis* is the lavender-flowered form that has resided in *C. nuttallii* in the past. Type locality is UT: Grand Co., I-70, ca 4 miles W of Colorado border (Welsh & Welsh 28943 BRY).	Cisco sego-lily	PerF	RegEn	Pres (may be Hist in both parks)	Rare	Welsh & Moore 2051 (BRY – dup at ARCH), Welsh 291 (BRY)	1963 (Arc) and 1955 (Din)	Newly described species. Welsh & Moore 2051 from ARCH and Welsh 291 from DINO both determined as *C. nuttallii* before. Other vouchers from DINO need to re-examined to see if *C. nuttallii* is still present.

Family	Species Name	Synonyms/ Taxonomic Notes	Common Name	Life Form	Range	Park Status	Pop. Size	Source (Repository)	Year Doc.	Park and Comments
Onagraceae	*Camissonia bolanderi*	Type locality is: UT: Emery Co., San Rafael Desert, upper Tidwell Draw, Atwood & Furniss 31354 (BRY)	Bolander's camissonia	AnnF	LocEn	Pres	Rare	Heil 2743 (BRY)	1986	Newly described species; Heil 2743 from CARE cited in Welsh et al. (2008) as belonging to this species.
Onagraceae	*Epilobium ciiatum*	*E. ciliatum* var. *ciliatum, E. watsonii, E. adenocaulon*	Northern willow-herb	PerF	Wide	Pres	Unc	Fertig & Reynolds 24216 (CEBR)	2008	New to CEBR, previously on Falsely reported list
Onagraceae	*Oenothera howardii*	*Oenothera brachycarpa*	Bronze evening -primrose	PerF	Wide	Pres	Unk	Moran s.n. (CANY)	2008	New to CANY
Plantaginaceae	*Plantago lanceolata*		English plantain	PerF	Intro	Pres	Unc	Moran s.n. (ARCH)	2008	New to ARCH
Polygonaceae	*Polygonum lapathifolium*	*Persicaria lapathifolia*	Willow-weed	AnnF	Intro	Rep	Unk	Moran s.n. (CANY)	2008	Reported (fragmentary voucher needs confirmation) for CANY. Nat-ive to Eurasia.
Polygonaceae	*Polygonum persicaria*	*Persicaria maculosa*	Lady's-thumb	AnnF	Intro	Rep	Unk	Moran s.n. (CANY)	2008	Reported (fragmentary voucher needs confirmation) for CANY. Nat-ive to Eurasia.
Rosaceae	*Potentilla gracilis* var. *hippianoides*	Type locality is UT: Uintah Co, Doug Chew's Cabin, DINO (Welsh 474, BRY)	Beautiful cinquefoil	PerF	Reg En	Hist	Rare	Welsh 474 (BRY)	1956	Newly described species, type from DINO.
Rosaceae	*Purshia tridentata*		Antelope bitterbrush	Shrub	Wide	Pres	Rare	Topp ST0713080 1 (UTC)	2008	New to GOSP, previously on potential list

Family	Species Name	Synonyms/ Taxonomic Notes	Common Name	Life Form	Range	Park Status	Pop. Size	Source (Repository)	Year Doc.	Park and Comments
Saxifragaceae (Hydrangeaceae)	*Jamesia americana* var. *rosea*		Rosy cliff jamesia	Shrub	Disj	Pres	Rare	Fertig & Reynolds 24147 (CEBR)	2008	New to CEBR and Utah. CEBR records previously cited as *J. americana* var. *zionis*.
Scrophulariaceae	*Penstemon caespitosus* var. *suffruticosus*	*P. tusharensis*	Tushar penstemon	PerF	LocEn	Pres	Rare	Fertig & Reynolds 24209 (CEBR)	2008	New to CEBR, previously listed as Potential

Family and species nomenclature follows Welsh et al. (2008).

Life form: AnnF = Annual Forb (non-woody broad-leaved plants that complete their life cycle in one year), AnnG = Annual Graminoid (grass-like plants that complete their life cycle in one year), Fern = Ferns and fern-allies (non-flowering vascular plants that reproduce by spores), PerF = Perennial Forb (non-woody broad-leaved plants that live for multiple years), PerG = Perennial Graminoid (grass-like plants that live for multiple years), Shrub (woody perennials with one to many trunks and usually less than 3.5 m tall), Tree (woody perennials with a single stem or trunk over 3.5 m tall).

Range: Disj = Disjunct (taxa with their in-state distribution separated from their main, contiguous range by a gap of more than 800 km or 500 miles), Intro = Introduced (non-native or exotic), LocEn = Local Endemic (taxa with their entire global range restricted to an area of less than 16,500 square km or 1 degree of latitude x 2 degrees of longitude), Periph = Peripheral (taxa that are widespread globally but occur at the margin of their contiguous range within a state), RegEn = Regional Endemic (taxa with a global range of 16,500-250,000 square km (an area about the size of the state of Wyoming), Wide = Widespread (taxa have global ranges exceeding 250,000 square km and occur over at least 10% of the state).

Park Status: Hist = Historical (not relocated since 1970), Pot = Potential (species has not been found in park yet but is known from similar habitats in vicinity), Pres = Present (confirmed with a voucher), Rep = Reported (cited for park in literature or based on a reliable observation, but without a voucher), FalsRep = False Report (previous report has been shown to be incorrect or is questionable)

Pop. Size (population size): Com = Common, Rare = Rare, Unc = Uncommon, Unk = Unknown.

Source: Literature reference or collector/collection number (and repository) for voucher specimen of species in park.

Year Doc.: earliest year in which species was reported.

Park and Comments: park acronyms are ARCH (Arches NP), BRCA (Bryce Canyon NP), CANY (Canyonlands NP), CARE (Capitol Reef National Park), CEBR (Cedar Breaks National Monument), CURE (Curecanti National Recreation Area), DINO (Dinosaur National Monument), FOBU (Fossil Butte National Monument), GOSP (Golden Spike National Historic Site), HOVE (Hovenweep National Monument), NABR (Natural Bridges National Monument), TICA (Timpanogos Cave National Monument), ZION (Zion National Park).

Table 2. Changes in Park Status based on 2008 Surveys and Corrections

Family	Species Name	Synonyms/ Taxonomic Notes	Common Name	Life Form	Range	Park Status	Pop Size	Source	Park and Comments
Boraginaceae	*Oreocarya suffruticosa*	*Cryptantha jamesii, C. cinerea* var. *jamesii*	James' cryptanth	PerF	Wide	Pres	Rare	Topp s.n. (CURE)	Confirmed as Present in CURE in 2008 (previously on reported list)
Chenopodiaceae	*Chenopodium berlandieri* var. *zschackei*	*C. album* var. *berlandieri*	Pitseed goosefoot	AnnF	Wide	False Rep	NA		Mistakenly left of CARE False Report list
Chenopodiaceae	*Suaeda linifolia*		Pin-leaf seepweed	AnnF	Intro	Pot	NA	Holmgren & Holmgren (2009)	New species for UT, discovered near GOSP boundary along old railroad line
Gramineae (Poaceae)	*Polypogon interruptus*	Hybrid between *Polypogon monspeliensis & Agrostis stolonifera*	Ditch polypogon	PerG	Intro	False Rep	NA	Springer et al. (2006)	Mistakenly left off CARE False Report list (questionable in park)
Leguminosae (Fabaceae)	*Psoralidium lanceolatum* var. *lanceolatum*	*Psoralea lanceolata*	Lemon scurf-pea	PerF	Wide	False Rep	NA		Mistakenly left off NABR False Report list (questionable)
Leguminosae (Fabaceae)	*Psoralidium lanceolatum* var. *stenostachys*	Included in var. *lanceolata* by some authors	Rydberg's scurf-pea	PerF	LocEn	False Rep	NA		Mistakenly left off NABR False Report list (questionable)
Rosaceae	*Potentilla diversifolia* var. *madsenii*	Type location: UT, Kane Co., Podunk Creek, ca 1/8 mile W of Bryce Canyon NP (Madsen 1230 BRY)	Madsen's cinquefoil	PerF	LocEn	Pot	NA		Newly described var. in 2008, type locality from just outside BRCA
Rosaceae	*Potentilla gracilis* var. *pulcherrima*		Beautiful cinquefoil	PerF	Wide	False Rep	NA	Welsh et al. (2008)	Previously cited as Historical in DINO, specimen has been determined as new var. *hippianoides* in Welsh et al. (2008)
Saxifragaceae (Hydrangeaceae)	*Jamesia americana* var. *zionis*		Zion jamesia	Shrub	LocEn	False Rep	NA	Fertig and Reynolds (2009)	Previous report from CEBR based on misidentified var. *rosea*.
Scrophulariaceae	*Verbascum thapsus*		Woolly mullein	PerF	Intro	Pres	Unk	Moran s.n. (CANY)	Previously reported for CANY, confirmed as present in 2008. Native to Eurasia.

Family and species nomenclature follows Welsh et al. (2008).

Life form: AnnF = Annual Forb (non-woody broad-leaved plants that complete their life cycle in one year), AnnG = Annual Graminoid (grass-like plants that complete their life cycle in one year), Fern = Ferns and fern-allies (non-flowering vascular plants that reproduce by spores), PerF = Perennial Forb (non-woody broad-leaved plants that live for multiple years), PerG = Perennial Graminoid (grass-like plants that live for multiple years), Shrub (woody perennials with one to many trunks and usually less than 3.5 m tall), Tree (woody perennials with a single stem or trunk over 3.5 m tall).

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Table 3. Nomenclatural Changes from the Fourth Edition of the Utah Flora (Welsh et al. 2008).

Family	Current Species Name (Welsh et al. 2008)	Former Species Name	ARCH	BRCA	CANY	CARE	CEBR	DINO	GOSP	HOVE	NABR	TICA	ZION	Comments
Agavaceae	*Yucca sterilis*	*Yucca harrimaniae* var. *sterilis*						Po						Var. *sterilis* recognized as a full species
Capparaceae (Cleomaceae)	*Cleomella hillmanii* var. *goodrichii*	*Cleomella palmeriana* var. *goodrichii*						R						Var. *goodrichii* transferred to *C. hillmanii*
Caryophyllaceae	*Cerastium arvense* var. *strictum*	*Cerastium arvense*		Po		Po		Pr				Po		Variety name added in Welsh et al. (2008)
Caryophyllaceae	*Silene scouleri* ssp. *hallii*	*Silene scouleri* ssp. *pringlei*					Po						Pr	UT material now considered to be ssp. *hallii*
Caryophyllaceae	*Spergularia salina*	*Spergularia marina*						Pr	Po				Po	Name change
Chenopodiaceae	*Chenopodium album*	*Chenopodium album* var. *album*	Pr	R	Pr	Pr	Pr	Po			R		R	*Chenopodium album* split into two species.
Chenopodiaceae	*Chenopodium berlandieri* var. *zschackei*	*Chenopodium album* var. *berlandieri*	Pr		Po	Pr		Po	Pr		Po			*Chenopodium album* split into two species.
Chenopodiaceae	*Salicornia rubra*	*Salicornia europaea* ssp. *rubra*						Po						Var. *rubra* elevated to full species
Chenopodiaceae	*Suaeda nigra* var. *nigra*	*Suaeda torreyana* var. *torreyana*	Pr	Pr	Pr	Pr		Pr	Po	Pr	Po			*S. torreyana* made a synonym of *S. nigra*
Compositae (Asteraceae)	*Aster kingii* var. *kingii*	*Aster kingii* (no variety)					F					Pr		Variety name added in Welsh et al. (2008)
Compositae (Asteraceae)	*Baccharis salicifolia*	*Baccharis glutinosa*			Po	F							Pr	*Baccharis glutinosa* made a synonym of *B. salicifolia*
Compositae (Asteraceae)	*Chrysothamnus nauseosus* var. *hololeucus*	*Chrysothamnus nauseosus* var. *gnaphalodes*	Pr	Pr	Pr	Pr		Po	Pr	Pr	Pr	Pr	Pr	Var. *gnaphalodes* made a synonym of var. *hololeucus*
Compositae (Asteraceae)	*Chrysothamnus nauseosus* var. *oreophilus*	*Chrysothamnus nauseosus* var. *consimilis*	Pr	Pr	Pr	Pr	Pr	Pr	Po	Po	Pr	Po	Pr	Var. *consimilis* made a synonym of var. *oreophilus*
Compositae (Asteraceae)	*Erigeron abajoensis*	Includes *Erigeron awapensis*		Pr		Pr								*E. awapensis* made a synonym of *E. abajoensis*
Compositae (Asteraceae)	*Erigeron glabellus* var. *glabellus*	*Erigeron glabellus* (without variety)					F	Pr						Variety name added in Welsh et al. (2008)
Compositae (Asteraceae)	*Erigeron vagus* var. *madsenii*	*Erigeron vagus* (without variety)		Pr			Pr							New variety name published by Welsh et al. (2008)
Compositae (Asteraceae)	*Gnaphalium canescens*	*Gnaphalium wrightii*				Pr							Pr	*Gnaphalium wrightii* made a synonym of *G. canescens*

Family	Current Species Name (Welsh et al. 2008)	Former Species Name	ARCH	BRCA	CANY	CARE	CEBR	DINO	GOSP	HOVE	NABR	TICA	ZION	Comments
Compositae (Asteraceae)	*Hymenoclea salsola*	*Ambrosia salsola*											Pr	*Ambrosia salsola* made a synonym of *Hymenoclea s.*
Compositae (Asteraceae)	*Hymenoxys hoopesii*	*Helenium hoopesii*		Po		Po	Pr							*Helenium hoopesii* made a synonym of *Hymenoxys h.*
Compositae (Asteraceae)	*Senecio flaccidus* var. *flaccidus*	*Senecio douglasii* var. *longilobus*	R	Po	R	Pr				Pr	Po		Pr	*S. douglasii* made a synonym of *S. flaccidus*
Compositae (Asteraceae)	*Senecio flaccidus* var. *monoensis*	*Senecio douglasii* var. *monoensis*											Po	*S. douglasii* made a synonym of *S. flaccidus*
Compositae (Asteraceae)	*Xylorhiza imberbis*	*Xylorhiza tortifolia* var. *imberbis*	Pr		Pr	Pr				Po	Po			Var. *imberbis* elevated to full species
Cruciferae (Brassicaceae)	*Alyssum parviflorum* var. *micranthum*	*Alyssum minus* var. *micranthum*				Pr		Pr		Pr				*Alyssum minus* made a synonym of *A. parviflorum*
Cruciferae (Brassicaceae)	*Arabis pulchra* var. *gracilis*	*Arabis pulchra* var. *munciensis*											Pr	Var. *munciensis* made a synonym of var. *gracilis*
Cruciferae (Brassicaceae)	*Brassica rapa*	*Brassica campestris*										Pr	H	*Brassica campestris* made a synonym of *B. rapa*
Cruciferae (Brassicaceae)	*Descurainia incana* var. *incisa*	*Descurainia incana* var. *sonnei*	Pr	R		R	Pr	Pr				Pr	Pr	Var. *sonnei* made a synonym of var. *incisa*
Cruciferae (Brassicaceae)	*Physaria kingii* var. *parvifolia*	*Physaria wardii*		Pr		Pr	Pr						Pr	*Physaria wardii* made a synonym of *P. kingii*
Cruciferae (Brassicaceae)	*Rorippa palustris* var. *glabra*	*Rorippa islandica* var. *glabra*				R	Pr							*Rorippa islandica* made a synonym of *R. palustris*
Cruciferae (Brassicaceae)	*Rorippa palustris* var. *hispida*	*Rorippa islandica* var. *hispida*						Pr			R			*Rorippa islandica* made a synonym of *R. palustris*
Cyperaceae	*Carex dioica* var. *gynocrates*	*Carex gynocrates*		Po			Pr							*Carex gynocrates* made a variety of *C. dioica*
Elatinaceae	*Elatine rubella*	*Elatine triandra*						Po					Po	*Elatine triandra* made a synonym of *E. rubella*
Guttiferae (Hypericaceae)	*Hypericum scouleri*	*Hypericum formosum* var. *scouleri*		Pr								Po	Pr	Var. *scouleri* elevated to full species
Leguminosae (Fabaceae)	*Dalea occidentalis*	*Dalea oligophylla*	Pr		Pr	Pr				Po	Pr			*Dalea oligophhylla* made a synonym of *D. occidentalis*
Leguminosae (Fabaceae)	*Lupinus latifolius* var. *leucanthus*	*Lupinus latifolius* var. *columbianus*											Pr	Var. *columbianus* made a synonym of var. *leucanthus*
Nyctaginaceae	*Abronia fragrans* var. *fragrans*	*Abronia fragrans* (without variety)	Pr	Pr	Pr	Pr		Pr		Pr	Pr		Pr	Two varieties recognized in Welsh et al. (2008)
Onagraceae	*Camissonia walkeri* var. *tortilis*	*Camissonia walkeri* (without variety)											H	Zion material belongs to new variety *tortilis*

Family	Current Species Name (Welsh et al. 2008)	Former Species Name	ARCH	BRCA	CANY	CARE	CEBR	DINO	GOSP	HOVE	NABR	TICA	ZION	Comments
Onagraceae	*Camissonia walkeri* var. *walkeri*	*Camissonia walkeri* (without variety)	Po		Pr	Pr		Pr	Po	Po				Two varieties recognized in Welsh et al. (2008)
Onagraceae	*Oenothera californica* var. *avita*	*Oenothera californica* (without variety)											H	New variety named by Welsh et al. (2008)
Polypodiaceae (Adiantaceae or Sinopterida-ceae)	*Pellaea glabella* ssp. *simplex*	*Pellaea glabella* var. *occidentalis*	Pr		Pr			Pr			Pr		Pr	Var. *occidentalis* made a synonym of ssp. *simplex*
Potamogeton-aceae	*Potamogeton fluitans*	*Potamogeton nodosus*						Pr						*Potamogeton nodosus* made a synonym of *P. fluitans*
Primulaceae	*Samolus valerandi*	*Samolus floribundus*											Pr	*Samolus floribundus* made a synonym of *S. valerandi*
Ranunculaceae	*Delphinium scaposum* var. *andersonii*	*Delphinium ander-sonii* var. *andersonii*							Po					*Delphinium scaposum* is the earliest name for the species
Ranunculaceae	*Delphinium scaposum* var. *scaposum*	*Delphinium ander-sonii* var. *scaposum*	Pr	Pr	Pr	Pr					R		Pr	*Delphinium scaposum* is the earliest name for the species
Umbelliferae (Apiaceae)	*Cymopterus alpinus*	*Oreoxis alpina*		Po									Po	*Oreoxis* made a synonym of *Cymopterus*
Umbelliferae (Apiaceae)	*Cymopterus macdou-galii*	*Aletes macdougalii* ssp. *breviradiatus*			Po						Pr			*Aletes* made a synonym of *Cymopterus*
Umbelliferae (Apiaceae)	*Cymopterus trotteri*	*Oreoxis trotteri*	F		Po						F			*Oreoxis* made a synonym of *Cymopterus*
Umbelliferae (Apiaceae)	*Pastinaca sativa* ssp. *sylvestris*	*Pastinaca sativa* (without ssp.)						Po						Subspecies recognized in Welsh et al. (2008)
Urticaceae	*Parietaria pensyl-vanica* var. *pensyl-vanica*	*Parietaria pensyl-vanica* (without var.)				Po							Pr	Varieties recognized in Welsh et al. (2008)

Family and species nomenclature follows Welsh et al. (2008).

Park Codes: ARCH (Arches NP), BRCA (Bryce Canyon NP), CANY (Canyonlands NP), CARE (Capitol Reef National Park), CEBR (Cedar Breaks National Monument),DINO (Dinosaur National Monument),GOSP (Golden Spike National Historic Site), HOVE (Hovenweep National Monument), NABR (Natural Bridges National Monument), TICA (Timpanogos Cave National Monument), ZION (Zion National Park).

Park Status: H = Historical (not relocated since 1970), Po = Potential (species has not been found in park yet but is known from similar habitats in vicinity), Pr = Present (confirmed with a voucher), R = Reported (cited for park in literature or based on a reliable observation, but without a voucher), F = False Report (previous report has been shown to be incorrect or is questionable)

Bryce Canyon National Park

No new species were documented for Bryce Canyon National Park in 2008. Welsh and Atwood described the new taxon *Potentilla diversifolia* var. *madsenii* from Claron limestone about 1/8 of a mile from the western boundary of the park. Madsen's cinquefoil should be added to the potential species list of Bryce Canyon and should be a priority for new surveys as potential habitat may exist in the park. This variety is distinguished from other varieties of *P. diversifolia* by the wide gap between the lowermost leaflets of the basal leaves and adjacent leaflets (Welsh et al. 2008) and is presently known only from the type locality. At least 16 other species from Bryce Canyon are affected by changes in species or variety nomenclature published in the 2008 revised Utah Flora (Table 3). One of these species is Madsen's daisy (*Erigeron vagus* var. *madsenii*), a newly described variety restricted to the Markagunt and Paunsaugunt plateaus of southern Utah (Welsh et al. 2008).

Canyonlands National Park

Southeast Utah Group biologist Mary Moran documented at least four new species for Canyonlands National Park in 2008 with vouchered specimens (Tables 1, 4). Bronze evening-primrose (*Oenothera howardii*) was collected in May from the Maze District. Yellow bluestem (*Bothriochloa ischaemum*) was found in the Needles District in early October. This introduced grass was previously on the park's potential list based on a collection from just east of the entrance to the ISKY area (Fertig et al. 2009b). Teal lovegrass (*Eragrostis hypnoides*) and Woolly mullein (*Verbascum thapsus*) were collected along the Green River. *Verbascum thapsus* had previously been reported for Canyonlands (Schelz et al. 2006) but without a confirmed specimen voucher.

Three other species are newly reported for Canyonlands by Mary Moran, but the specimen vouchers lack floral parts for positive confirmation. These species include two non-natives (*Polygonum persicaria* and *P. lapathifolium*) and Canada mint (*Mentha arvensis*) which was previously on the potential species list. An additional potential report of *Bidens comosa* from the Green River needs confirmation. This species is currently listed as Falsely Reported for the park based on a Schelz collection in the CANY herbarium made from outside the park. The similar *Bidens cernua* is already known from Canyonlands National Park based on a collection by Glen Rink in 2005.

With the addition of these six new species, the documented flora of Canyonlands National Park now stands at 600 (Table 4). The number of non-native plants in the park has increased to 71. None of the three newly documented introduced species is on the state of Utah Noxious weed list. Fifteen species from Canyonlands have revised names based on changes introduced by Welsh et al. (2008) in the new edition of *A Utah Flora* (Table 3).

The recently described *Calochortus ciscoensis* from Arches National Park and Mancos shale badlands near Cisco and Ducshesne River formation deposits in the Uinta Basin, should be sought in Canyonlands. Several *Calochortus* specimens in the CANY

herbarium do not fit *C. flexuosus* or *C. nuttallii* particularly well, and perhaps belong to this new taxon.

Table 4. Revised Statistical Summary of the Flora of Canyonlands National Park. This table updates Table 3.1 from Fertig et al. (2009b) and reflects new species discovered or relocated in 2008. The number of taxa and families is based on taxonomic concepts of Welsh et al. (2008).

Flora of Canyonlands National Park	Present or Historical in Park	Reported for Park	Total
Taxonomic Diversity			
Total # of Taxa (including varieties and sub-species)	538	62	600
# of Full Species (excluding varieties and subspecies)	514	57	571
# of Families	70	2	72
Life Form Diversity			
# of Tree Taxa	15	5	20
# of Shrub Taxa	85	8	93
# of Perennial Forb Taxa	240	27	267
# of Annual Forb Taxa	99	11	110
# of Perennial Graminoid Taxa	73	10	83
# of Annual Graminoid Taxa	18	1	19
# of Fern Taxa	8	0	8
Biogeographic Diversity			
# of Introduced Taxa	52	19	71
# of Locally Endemic Taxa	15	1	16
# of Regionally Endemic Taxa	83	8	91
# of Disjunct Taxa	0	0	0
# of Peripheral Taxa	12	4	16
# of Sparse Taxa	4	3	7
# of Widespread Taxa	372	27	399
Total # Native Taxa	487	45	529

Capitol Reef National Park

The confirmed flora of Capitol Reef National Park has increased by one species to 888 taxa (Fertig 2008a) with the recognition of Bolander's camissonia (*Camissonia bolanderi*), a new species recently described by Duane Atwood and Stanley Welsh. Welsh et al. (2008) cite a 1986 collection by Ken Heil (#2743, BRY) from the park as representing this species. The collection was originally determined as *Camissonia walkeri*, which is characterized by having a well-developed basal rosette of multi-lobed leaves. Bolander's camissonia differs in having mostly small, simple leaves and lacks a basal rosette. *Camissonia walkeri* is still present in Capitol Reef National Park, but collections assigned to this species should be re-examined. At present, *Camissonia bolanderi* is known mostly from the San Rafael area of Emery County, Utah and should be considered a high priority for additional survey. It currently has no legal protective status.

Additional corrections are needed for the list of rejected species for Capitol Reef National Park from Fertig (2008a). Awapa daisy (*Erigeron awapensis*), previously listed as falsely reported, has been synonymized with Abajo daisy (*Erigeron abajoensis*) by Welsh et al. (2008). Authenticated specimens of true Abajo daisy are known from the park. Ditch polypogon (*Polypogon interruptus*) was inadvertently left off of the list of questionable reports for Capitol Reef. This introduced species closely resembles the widespread *Polypogon monspeliensis* (found infrequently in Capitol Reef) and had been reported without a voucher by Springer et al. (2006). Pitseed goosefoot (recently renamed *Chenopodium berlandieri* var. *zschakei* from *C. album* var. *berlandieri*) was cited as misidentified under comments on *Chenopodium album* var. *album* in the list of confirmed species for the park in Fertig (2008a), but was not included in the comparable list of falsely reported taxa. Besides *C. berlandieri,* 20 other species names in Fertig (2008a) have been revised based on nomenclatural changes from Welsh et al. (2008) (Table 3).

Cedar Breaks National Monument

While surveying for rare plant species in Cedar Breaks National Monument in 2008, Fertig and Reynolds (2009) discovered 8 new species for the monument flora and corrected one previous misidentification (Tables 1, 2). One additional new species (*Cirsium clavatum* var. *clavatum*) was verified for the monument based on a specimen located at the Brigham Young University herbarium (BRY). These additions raised the total known flora of the monument to 354 species, an increase of 2.3% (Table 5). Seven of the newly documented species had previously been on the potential species list for Cedar Breaks (Fertig 2009a), and one other had been falsely reported (*Epilobium ciliatum*). Tushar penstemon (*Penstemon caespitosus* var. *suffruticosus*) is a local endemic of the mountains of southwestern Utah and had been collected in the Ashdown Gorge Wilderness just outside of the monument in 2007. This species was not included in the rare plant survey of Fertig and Reynolds (2009), but might be sought in other areas of suitable gravelly terrace habitat in the bottom of Ashdown Gorge in the future.

The most notable new species documented in 2008 was Rosy cliff jamesia (*Jamesia americana* var. *rosea*), a species formerly known only from southeastern California and southern Nevada. In previous reports, this taxon was referred to as *J. americana* var. *zionis*, a local southwestern Utah endemic found in Zion National Park and the vicinity of Kanab. The two varieties differ in leaf size, flower color, and habitat. Var. *zionis* has larger leaves (3-5.5 cm long x 2-4.5 cm wide), white-petaled flowers, and occurs primarily in hanging garden communities. Material from Cedar Breaks has much smaller leaves (1.3-3 cm long x 1-2.2 cm wide), red or pink flowers, and grows on dry,

Table 5. Revised Statistical Summary of the Flora of Cedar Breaks National Monument. This table updates Table 3.1 from Fertig (2009a) and reflects new species discovered or relocated in 2008. The number of taxa and families is based on taxonomic concepts of Welsh et al. (2008).

Flora of Cedar Breaks National Monument	Present or Historical in Park	Reported for Park	Total
Taxonomic Diversity			
Total # of Taxa (including varieties and subspecies)	347	7	354
# of Full Species (excluding varieties and subspecies)	335	5	340
# of Families	56	0	56
Life Form Diversity			
# of Tree Taxa	14	1	15
# of Shrub Taxa	36	1	37
# of Perennial Forb Taxa	203	3	206
# of Annual Forb Taxa	13	1	14
# of Perennial Graminoid Taxa	71	1	72
# of Annual Graminoid Taxa	3	0	3
# of Fern Taxa	7	0	7
Biogeographic Diversity			
# of Introduced Taxa	17	1	18
# of Locally Endemic Taxa	18	0	18
# of Regionally Endemic Taxa	20	0	20
# of Disjunct Taxa	2	0	2
# of Peripheral Taxa	0	0	0
# of Sparse Taxa	6	0	6
# of Widespread Taxa	284	6	290
Total # Native Taxa	329	6	335

lime-rich sandstone ledges and cliffs, all traits shared by var. *rosea*. Diagnostic photos of the Cedar Breaks plants were corroborated as var. *rosea* by Noel and Patricia Holmgren of the New York Botanical Garden, who wrote the most recent taxonomic monograph of the genus in 1989. The populations in Cedar Breaks National Monument and the adjacent Ashdown Gorge Wilderness Area of Dixie National Forest are disjunct by nearly 125 miles from the nearest known occurrences of var. *rosea* in the Sheep Mountains of Clark County, Nevada and represent the first reports of this variety for the state of Utah. Other reports of *J. americana* var. *zionis* from Cedar Breaks National Monument are now thought to represent var. *rosea*, and var. *zionis* should be considered falsely reported for the monument.

Eleven species from Cedar Breaks National Monument have been given new names in the latest edition of *A Utah Flora* (Welsh et al. 2008) (Table 3). This list includes Madsen's daisy (*Erigeron vagus* var. *madsenii*) which was formally described as a new variety by Welsh and Atwood in 2008. Var. *madsenii* is a local endemic of the high plateaus of southern Utah and differs from the more widely distributed var. *vagus* in having consistently narrower, grayish leaves.

Curecanti National Recreation Area

In 2008, Sarah Topp made the first collection of *Oreocarya suffruticosa* (*Cryptantha cinerea* var. *jamesii*) in Curecanti National Recreation Area. This species had previously been reported for the NRA by Flowers et al. (1962) without a voucher in the early 1960s (Hogan et al. 2009b). The discovery does not change the total number of plant species known for Curecanti (677 taxa), but increases the number of documented species (with vouchers) to 526.

Dinosaur National Monument

Two new species were documented for the flora of Dinosaur National Monument in 2008 based on taxonomic revisions from *A Utah Flora, fourth edition* (Welsh et al. 2008). Cisco sego lily (*Calochortus ciscoensis*) is a newly described species with l avender petals that often lack a colored chevron mark above the gland and was formerly included within *C. nuttallii*. Welsh et al. (2008) cite one 1955 collection of *C. ciscoensis* (Welsh #291, BRY) from "head of Redway No. 7" in Dinosaur National Monument. Other collections of *C. nuttallii* from the DINO herbarium should be re-examined to determine whether both species still occur in the area and their relative distribution and abundance. A second historical Welsh collection (Welsh # 474, BRY) from "Doug Chew's Cabin, Blue Mountain, Dinosaur National Monument" has been designated the holotype of *Potentilla gracilis* var. *hippianoides*, a newly described variety named by Stan Welsh and Duane Atwood. Previously, this collection was identified as *P. gracilis* var. *pulcherrima,* which differs from *hippianoides* in having palmate rather than pinnately arranged leaflets. The Welsh collection was the only record for var. *pulcherrima* in Dinosaur National Monument, and so this variety should now be considered falsely reported. Both *Calochortus ciscoensis* and *Potentilla gracilis* var. *hippianoides* are apparently Utah state endemics and should be considered as potential

species of conservation concern in the monument until their local and range-wide status is better determined.

Assuming that *Calochortus nuttallii* is still represented in the flora, there are now 757 species documented for Dinosaur National Monument (including 485 in the Utah portion of the monument). Other taxonomic changes in the revised Utah Flora affect the names of 20 other plant species in the monument (Table 3).

Fossil Butte National Monument

While working on an invasive species mapping project in 2008, Sarah Topp observed (though did not collect) *Chrysothamnus parryi* in Fossil Butte National Monument. This species was not previously reported for the monument (Fertig and Kyte 2009), but is known from similar habitats in the vicinity. Though not identified as such in the field, the population at Fossil Butte would most likely represent var. *howardii*. The inclusion of this species increases the confirmed and reported flora of Fossil Butte National Monument to 547 species.

Golden Spike National Historic Site

The Northern Colorado Plateau Network invasives mapping team discovered five new species for the flora of Golden Spike National Historic Site during 2008 survey work (Table 6). Three of the new species (*Aegilops cylindrica, Purshia tridentata,* and *Sarcobatus vermiculatus*) had previously been on the park's potential list (Fertig 2009c). Sarah Topp collected a voucher of Winterfat (*Krascheninnikovia lanata*), a native shrub not previously known from the historic site. Rebecca Weissinger added *Psoralidium lanceolatum* var. *lanceolatum* to the local flora, which also represented a first report for Box Elder County. The new species increase the known and reported flora of Golden Spike National Historic Site to 149 species and the native flora of the park to 104 species (Table 6).

Holmgren and Holmgren (2009) discovered a new exotic species for Utah along the railroad grade just outside Golden Spike in 2008. Pin-leaf seepweed (*Suaeda linifolia*) is an annual forb native to Eurasia that had previously been known from northeastern Nevada and southwestern Wyoming. This species should be sought in saline soils in the vicinity of the abandoned railroad bed within the historic site boundary.

Welsh et al. (2008) made nomenclatural changes that affect seven species which have been confirmed or potentially occur in the Golden Spike area (Table 3).

Table 6. Revised Statistical Summary of the Flora of Golden Spike National Historic Site. This table updates Table 3.1 from Fertig (2009c) and reflects new species discovered or relocated in 2008. The number of taxa and families is based on taxonomic concepts of Welsh et al. (2008).

Flora of Golden Spike National Historic Site	Present or Historical in Park	Reported for Park	Total
Taxonomic Diversity			
Total # of Taxa (including varieties and subspecies)	142	7	149
# of Full Species (excluding varieties and subspecies)	141	6	147
# of Families	31	1	32
Life Form Diversity			
# of Tree Taxa	0	0	0
# of Shrub Taxa	21	2	23
# of Perennial Forb Taxa	62	3	65
# of Annual Forb Taxa	37	1	38
# of Perennial Graminoid Taxa	14	1	15
# of Annual Graminoid Taxa	8	0	8
# of Fern Taxa	0	0	0
Biogeographic Diversity			
# of Introduced Taxa	41	4	45
# of Locally Endemic Taxa	1	0	1
# of Regionally Endemic Taxa	5	0	5
# of Disjunct Taxa	0	0	0
# of Peripheral Taxa	2	0	2
# of Sparse Taxa	3	0	3
# of Widespread Taxa	90	3	93
Total # Native Taxa	101	3	104

Hovenweep National Monument

No new species were reported for Hovenweep National Monument in 2008. Based on the newest edition of *A Utah Flora* (Welsh et al. 2008) the names of 9 species from the monument need to be revised to keep up with current nomenclature (Table 3).

Natural Bridges National Monument

Mary Moran reports no new species were found in Natural Bridges National Monument in 2008. Name changes introduced by Welsh et al. (2008) affect 14 taxa from the monument's list of confirmed, reported, potential, and rejected species (Table 3). Two species were mistakenly left off the list of falsely reported plants from Natural Bridges (Fertig 2008b): *Psoralidium lanceolatum* var. *stenostachys* and *P. lanceolatum* var. *lanceolatum*.

Timpanogos Cave National Monument

No new species were documented for Timpanogos Cave National Monument in 2008. At least seven species from the monument flora (Fertig and Atwood 2008) are affected by nomenclatural changes proposed by Welsh et al. (2008).

Zion National Park

One new exotic annual grass, Wild oats (*Avena fatua* var. *sativa*) was documented in the park housing area in Oak Canyon by Walter and Laura Fertig in 2008, but this discovery was included in the final annotated checklist for Zion National Park (Fertig and Alexander 2008b). No other new species reports are known. Nomenclatural changes in the 2008 edition of A Utah Flora (Welsh et al. 2008) affect 24 species from the park (Table 3).

Discussion

A total of 62 new species were documented in nine of the 16 park units in the Northern Colorado Plateau Network based on field surveys and review of recent literature in 2008. This figure includes 36 new plant species discovered in Pipe Spring National Monument which are addressed in a separate report (Fertig 2008c). Three of the new taxa recognized in the network are based on species described as new to science by Welsh et al. (2008): *Calochortus ciscoensis*, *Camissonia bolanderi*, and *Potentilla gracilis* var. *hippianoides*. A fourth new taxon, *Erigeron vagus* var. *madsenii,* was already known within the network under a different name. At least 48 species that were on confirmed, reported, potential, or falsely reported lists received new names based on taxonomic revisions in the 2008 Utah Flora (Welsh et al. 2008).

The discovery of so many new species underscores the importance of continued inventory and monitoring research in National Park units. Most of the newly discovered species were found in the course of other projects, including invasive species inventories, rare species surveys, and monitoring. It is likely that additional new discoveries will be made in future projects provided that research personnel are informed and encouraged to report new or unusual sightings (and permitted to make voucher collections). The large number of changes in park status and nomenclature also demonstrate the importance of keeping databases, such as NPSpecies, regularly updated. This in turn will require regular dedication of staff time to ensure data entry

and quality control occur. Although the National Park Service's Inventory and Monitoring program is evolving towards a greater emphasis on monitoring, the large number of new plant discoveries in the past year amply demonstrates that inventory work is far from complete.

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